PROPOSED BZ

DEMILITARIZATION FACILITY

FOR

PINE BLUFF ARSENAL, ARKANSAS X Reparal/

9833821 **USATHAMA**

RICHARD ROUX

(301) 671-3446

PURPOSE

- PROVIDE BACKGROUND INFORMATION
- IDENTIFY DATA SOURCES
- OBTAIN SCOPING INPUT
- INITIATE PERMITTING REQUIREMENTS

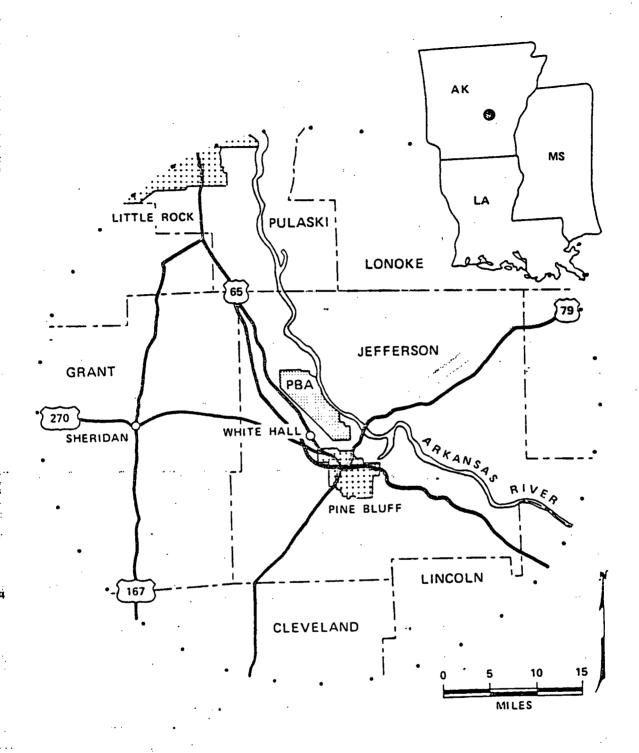
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PRINCIPAL AGENCIES (CONTACTS)

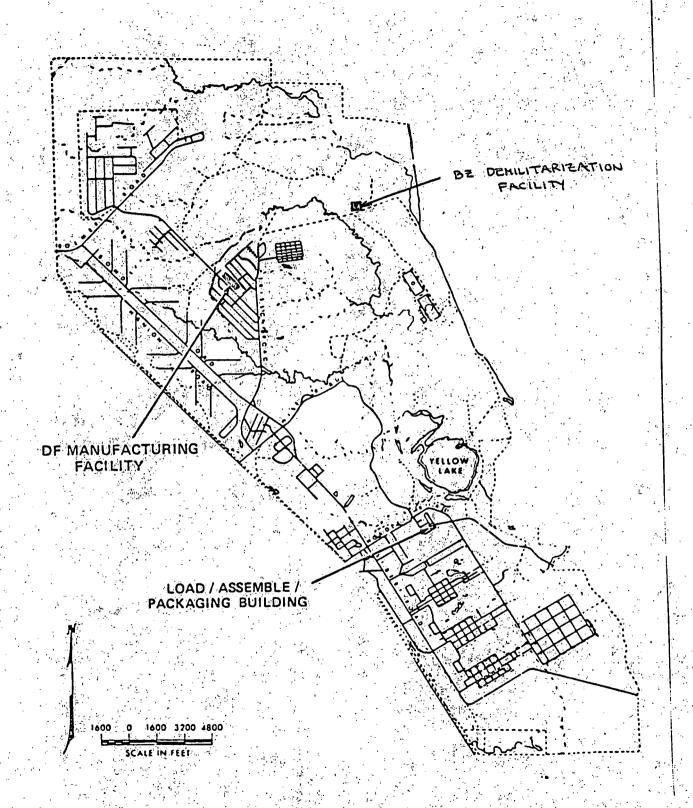
- US ARMY TOXIC AND HAZARDOUS MATERIALS AGENCY (USATHAMA)
- RICHARD G. ROUX (SYSTEMS MANAGER)
- CPT JAMES D. WOOD (ENVIRONMENTAL ENGINEER)
- PINE BLUFF ARSENAL
- JAMES STUART (ASSOCIATE SYSTEMS MANAGER)
- THOMAS SHOOK (ENVIRONMENTAL COORDINATOR)
- BATTELLE COLUMBUS LABORATORIES (COLUMBUS, OHIO)
- PETER VAN VORIS (ENVIRONMENTAL DOCUMENT TASK MANAGER)
- MARY ANN EISCHEN (DEPUTY TASK MANAGER)

TOPICS TO BE DISCUSSED

- PINE BLUFF ARSENAL BACKGROUND (MR. SHOOK)
- BZ AGENT DESCRIPTION (MR. ROUX)
- BZ MUNITION DESCRIPTION AND HISTORY (MR. STUART)
- BZ DISPOSAL PROGRAM DESCRIPTION (MR. ROUX)
- PROPOSED PLANT DESCRIPTION (MR. STUART / MR. ROUX)
- PLANT PROCESSES (CPT WOOD)
- ENVIRONMENTAL DOCUMENTATION (MR. VAN VORIS)

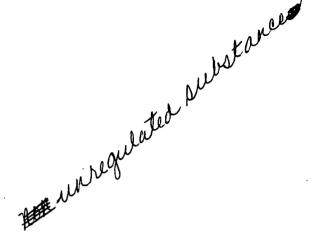


Pine Bluff Arsenal, Arkansas, and the Surrounding Area

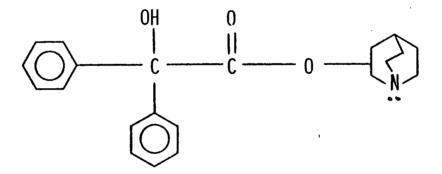


BZ AGENT SUMMARY

- CLASSIFIED AS INCAPACITATING AGENT
- WHITE CRYSTALLINE POWER
- MIND AFFECTING DRUG
- DELAYED SYMPTOMS (1-6 HOURS)
- PROLONGED EFFECTS (DAYS/WEEKS)



STRUCTURE OF AGENT BZ (3-QUINUCLIDINYL BENZILATE)



PROPERTIES OF AGENT BZ

- MOLECULAR WEIGHT: 337.4
- VAPOR DENSITY: 11.6 (COMPARED WITH AIR)
- SOLID DENSITY: 0.51 G/cc (BULK); 1.33 G/cc (CRYSTAL)
- FREEZING POINT: 167.5°C
- BOILING POINT: 412°C (CALCULATED, DECOMPOSES)
- VAPOR PRESSURE: NEGLIGIBLE (0.03 µmHg a 70°C)
- VOLATILITY: NEGLIGIBLE (0.5 mg/m³ a 70°C)
- FLASH POINT: 246°C
- DECOMPOSITION TEMPERATURE: 170°C (BEGINS)

200°C (1-2 HR COMPLETE)

- HEAT OF COMBUSTION: 7814 CAL/GM
- RATE OF HYDROLYSIS: HALF LIFE 3-4 WEEKS a PH 7 (25°C)

HALF LIFE - 400 MINUTES a PH 9.8 (25°C)

HALF LIFE - 1.8 MINUTES a PH 13 (25°C)

army suventory at PBA

BZ MATERIALS AT PBA

- BULK AGENT
- MUNITIONS
 - -M43 GENERATOR CLUSTER
 - -M44 BOMB CLUSTER
- MANUFACTURING PLANT RESIDUES
- IGLOO FIRE RESIDUES
- DEMILITARIZATION PROGRAM RESIDUES

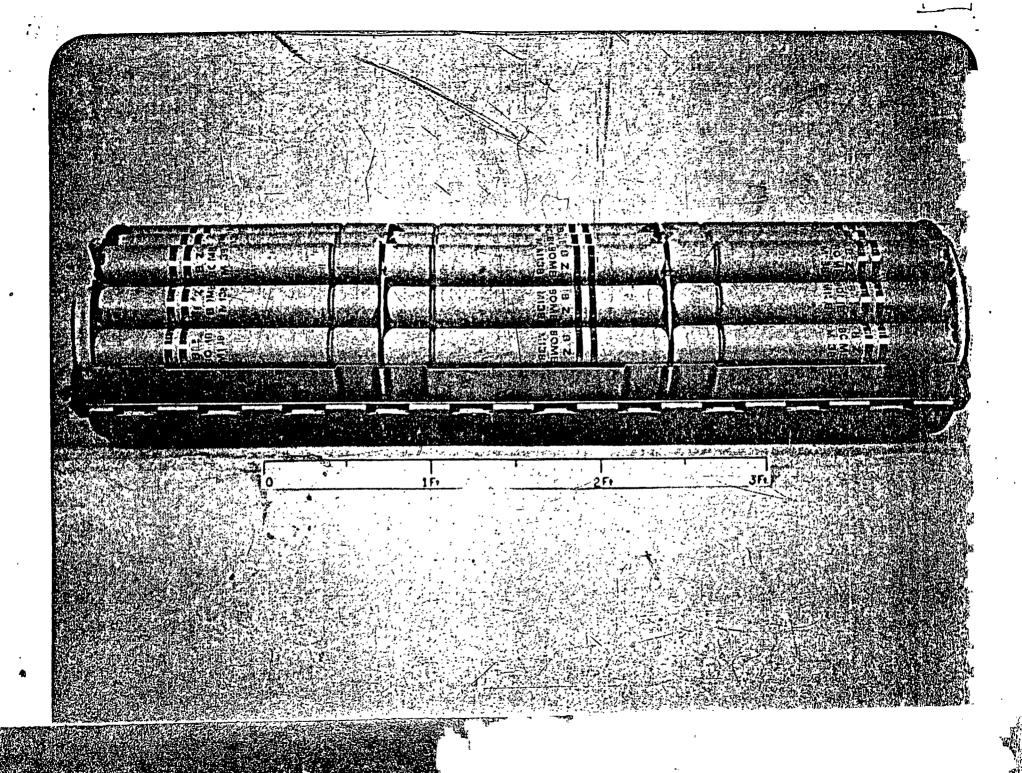
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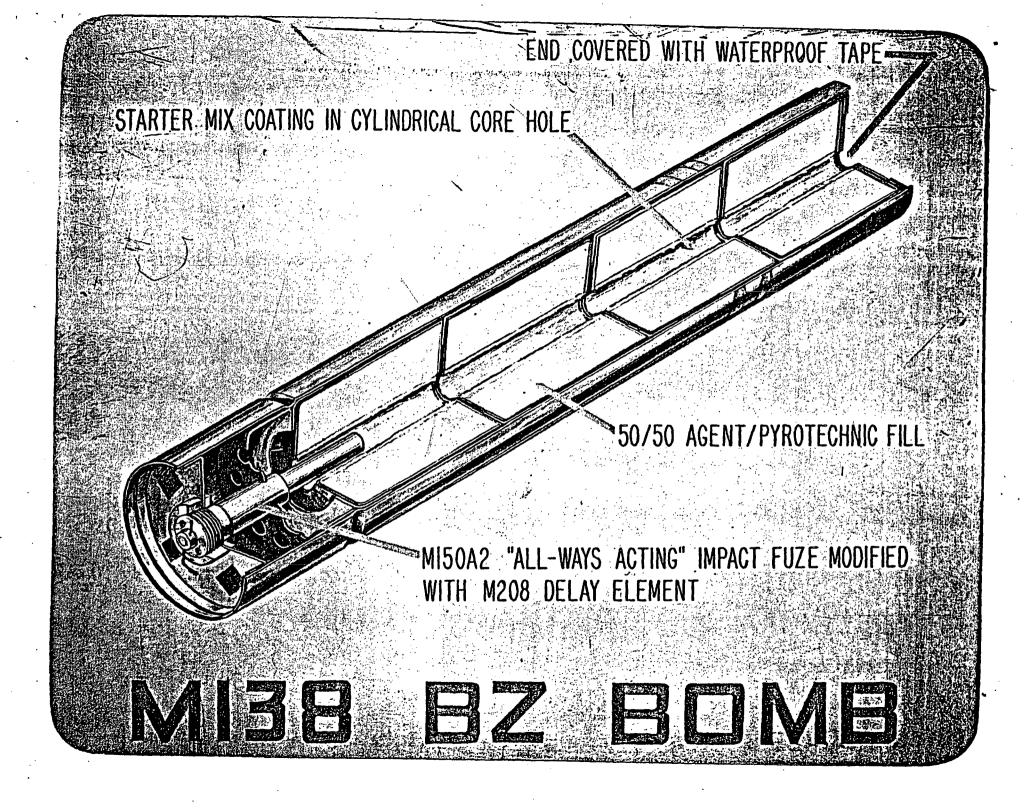
DISPOSAL RATIONALE

- STOCKPILE OUT-DATED
- DECLARED OBSOLETE
- STORAGE COSTLY
- POTENTIAL STORAGE HAZARD
- DISPOSAL TECHNOLOGY NOW AVAILABLE

BZ STOCKPILE MUNITIONS

- M43 BOMB CLUSTER -5tover 700 #
- M44 GENERATOR CLUSTER



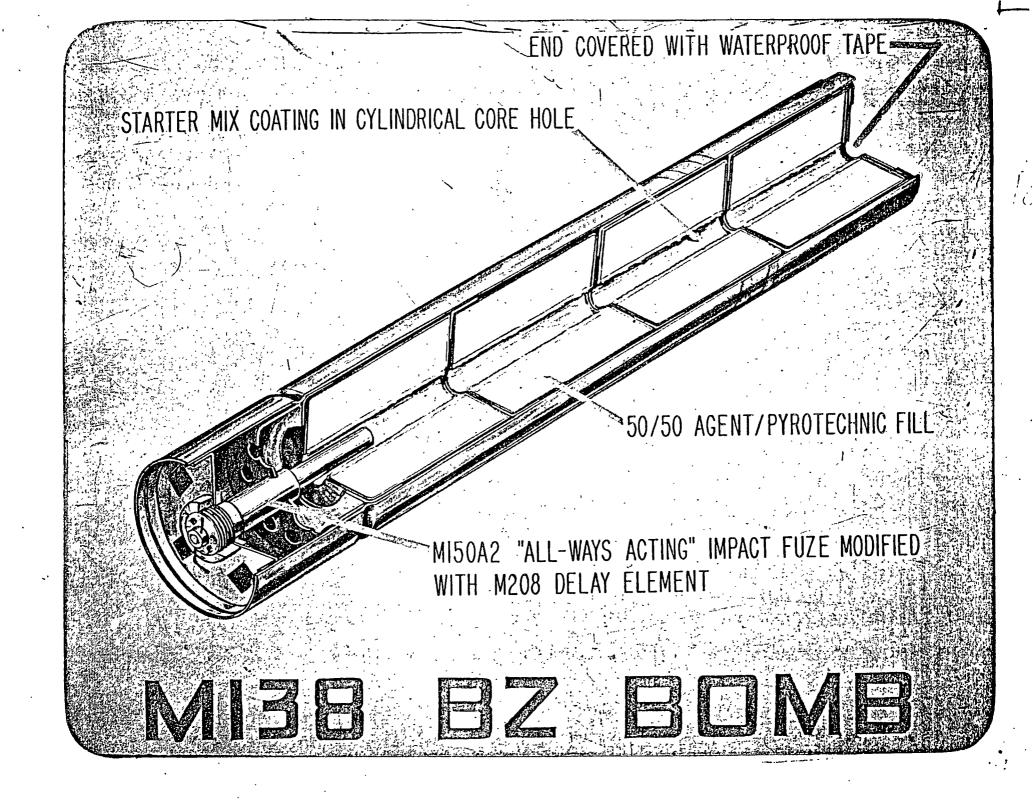


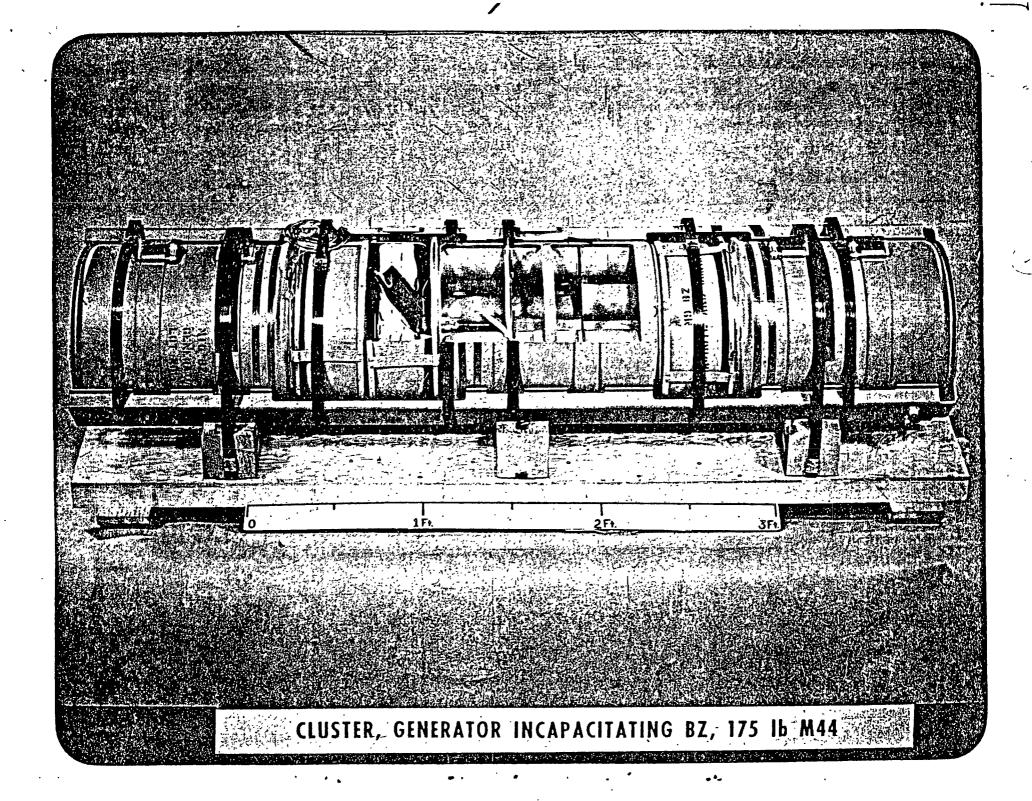
BZ SUBMUNITION GEOMETRY

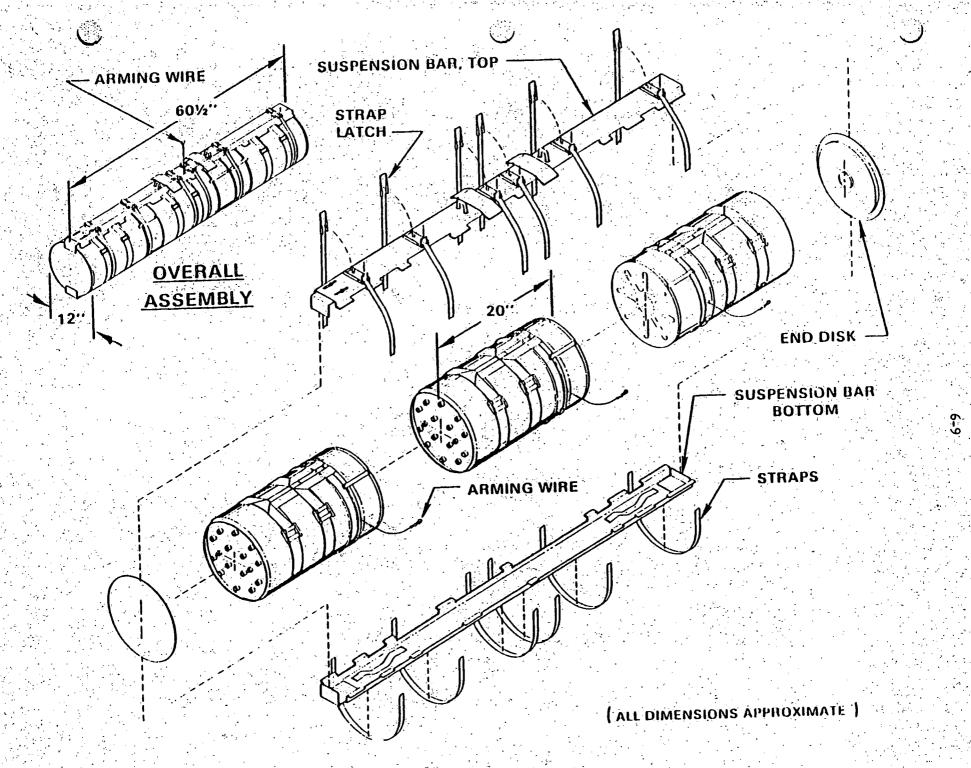
- SUBMUNITIONS CONTAIN A 50-50 WEIGHT PERCENT PRESSED FILL OF BZ-PYROTECHNIC.
- THE PRESSED FILL IS IN THE SHAPE OF AN ANNULUS.
- THE FILL IS ENCASED IN A STEEL MUNITION JACKET WITH CENTRAL HOLE (VENTED).
- THE ANNULUS IS COATED WITH STARTER MIX (EASILY IGNITED MATERIAL).

BZ MUNITION FUNCTIONING STEPS

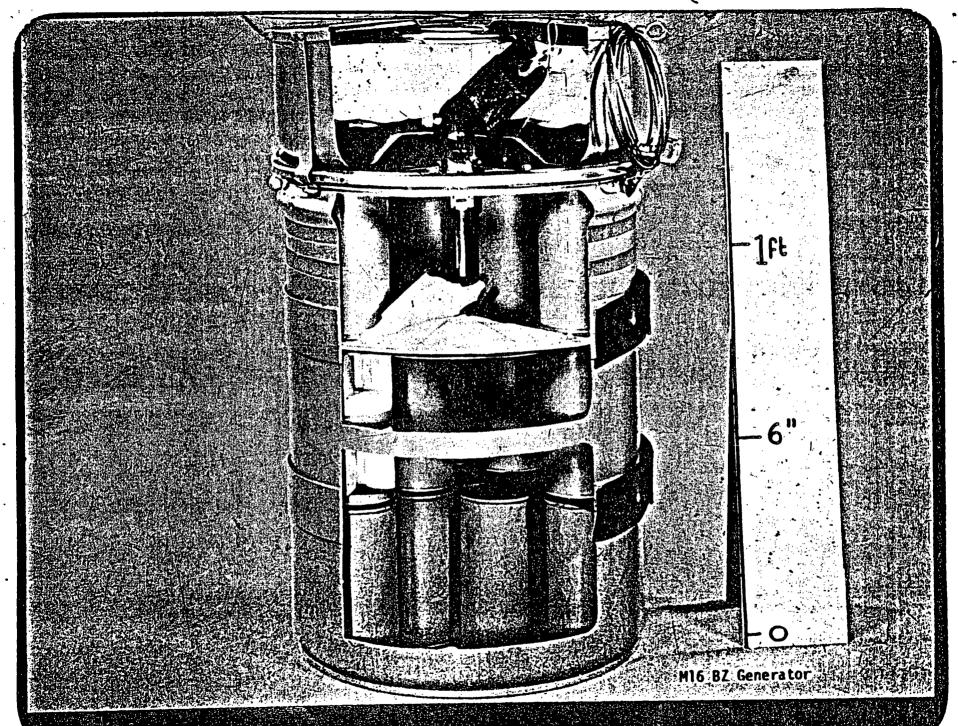
- FUZE INITIATED.
- FUZE FUNCTIONS AFTER DELAY, IGNITING STARTER MIX.
- FLAME PROPAGATES INTO BZ/PYRO MIX.
- HEAT LIBERATED BY BURNING PYRO VOLATILIZES BZ.
- BZ VAPOR LEAVES MUNITION BODY AND CONDENSES INTO FINE PARTICULATE (AEROSOL) CLOUD.
- PERSONNEL HAZARD INGESTION/INHALATION.





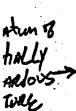


M44 BZ GENERATOR CLUSTER



BZ DISPOSAL PROGRAM MUNITION DEVELOPMENT HISTORY

- BZ DEVELOPED FOR PHARMACEUTICAL APPLICATIONS
- DA PURCHASED LICENSE TO PRODUCE
- CRASH PROGRAM TO ACHIEVE LIMITED CAPABILITY, 1961-64
- PRODUCTION PROBLEMS
- MUNITION INSTABILITY DOCUMENTED IN POST PRODUCTION TESTING
- STORAGE FIRE AT PBA, 1971



COMPLETED LABORATORY STUDIES

- CHEMICAL NEUTRALIZATION
- ANALYSIS AND DETECTION OF BZ
- INCINERATION OF BZ
- BZ MUNITION SAFETY
- BZ MUNITION DISASSEMBLY TECHNIQUES
- TOXICOLOGY OF BZ
- PYROTECHNIC INCINERATION
- REMOVAL OF BZ FROM AQUEOUS WASTE STREAMS
- BZ ALARMS
- CANDIDATE AIR POLLUTION CONTROL SYSTEMS
- BZ MUNITION PRODUCTION AND STORAGE RECORDS
- M18 MUNITION FIELD TESTS

PROCESS DEVELOPMENT ACTIVITIES

- I. REVIEW THE LAB PHASE RESULTS FOR DESIGN AND SCALEUP DATA
- II. REVISE THE PRELIMINARY CONCEPT DESIGN
- III. OBTAIN REQUIRED PROCESS DEVELOPMENT DATA
- IV. PREPARE A DETAILED CONCEPT DESIGN COMPRISED OF:
 - * INTEGRATED CONCEPT FOR ENTIRE FACILITY
 (BUILDING AND PROCESS EQUIPMENT)
 - * DETAILED SPECIFICATIONS/DRAWINGS FOR PROCESS EQUIPMENT

OPERATIONAL PHASE (30 MONTHS)

- 6 MONTHS SYSTEM TESTING
- 18 MONTHS BZ DISPOSAL OPERATIONS
- 6 MONTHS PLANT CLEANUP

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PLANT FEATURES

- \$ 35M CONSTRUCTION AND \$25M OPERATIONAL COSTS
- 12 ACRE SITE (REMOTE)
- 90 MAN WORK STAFF ON SITE EACH DAY
- PLANT STAFFED ON 3 SHIFT BASIS (5 DAYS/WEEK)
- ONE SHIFT/DAY OF MUNITION PROCESSING
- INCINERATION IS AGENT DESTRUCTION METHOD

July 2 - clear rep 3 - idle

3 - idle

property

proper

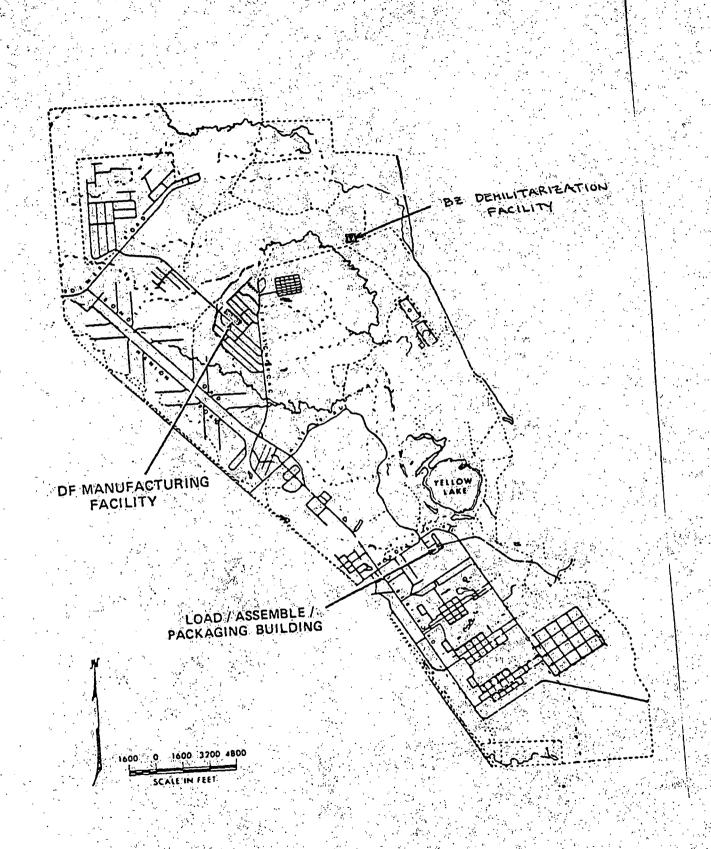
DESIGN FEATURES

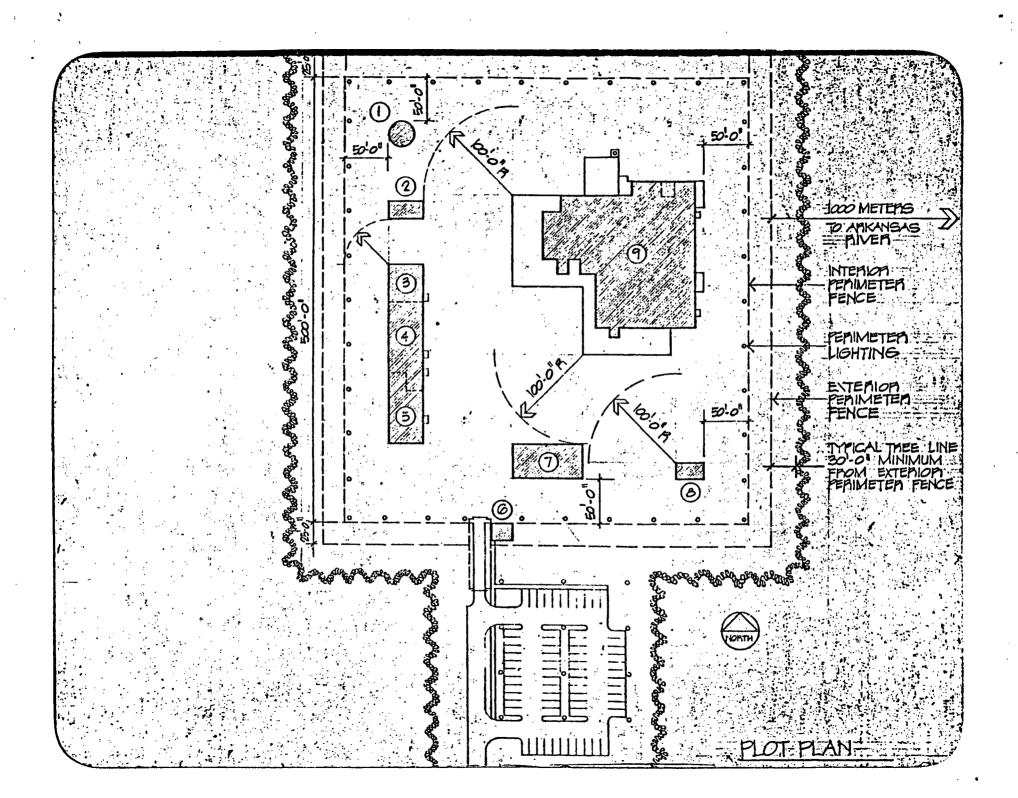
- TOTAL CONTAINMENT (NO RELEASE FROM WORST CASE INPLANT ACCIDENT FUNCTIONING OF M138 SUBMUNITION)
- REDUNDANT (BACKUP) EQUIPMENT ON CRITICAL SYSTEMS
- EMERGENCY POWER PROVIDED
- ELABORATE VENTILATION SYSTEM.
- FURNACE EXHAUST STACK AND PLANT WORKING AREAS CONTINUOUSLY MONITORED
- SOLID AND LIQUID EFFLUENTS ISOLATED, SAMPLED, AND CERTIFIED PRIOR TO THEIR RELEASE FROM THE PLANT SITE

SOLID AND LIQUE CERTIFIED PRIOR

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CHEMICAL DEMILITARIZATION

DISPOSAL OF BZ AGENT/MUNITIONS PROJECT OVERVIEW

OBJECTIVE: DEMILITARIZE ALL BZ/PYROTECHNIC MUNITIONS, BULK BZ AND BZ CONTAMINATED RESIDUES

FY80 & PRIOR	FY81	FY82	FY83	FY84	FY85	FY86	FY87	FY88
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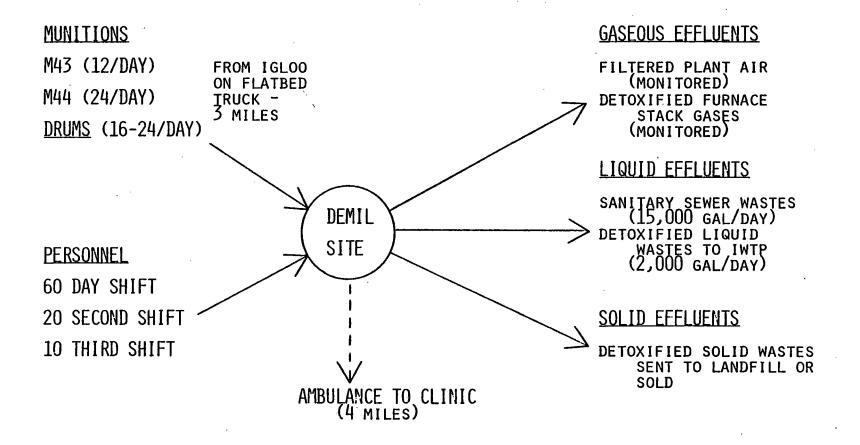
MAJOR PROJECT AREAS

LABORATORY PHASE
PROCESS DEVELOPMENT PHASE
CONSTRUCTION PHASE
OPERATIONS PHASE

OPERATIONAL SEQUENCE FOR BZ MUNITIONS

OPERATION	EXPLANATION
UNPACK	REMOVE DUNNAGE FROM CLUSTER
INERT	SOAK CLUSTER UNDER WATER TO MAKE SAFE TO HANDLE
DOWNLOAD	REMOVE SUBMUNITIONS FROM CLUSTER ARRAY
DEACTIVATE	DESTROY SUBMUNITIONS IN DEACTIVATION FURNACE
5X DECON	THERMALLY TREAT TO DESTROY RESIDUAL AGENT

BZ PLANT INPUTS/OUTPUTS



MAJOR OPTIONS CONSIDERED

PLANT LOCATION:

- PBA (NEW)
- O PBA (RENOVATION OF EXISTING SITE)
- O TRANSFER TO UTAH PLANT (CAMDS)
- O TRANSFER TO COLORADO PLANT (RMA)

AGENT DESTRUCTION

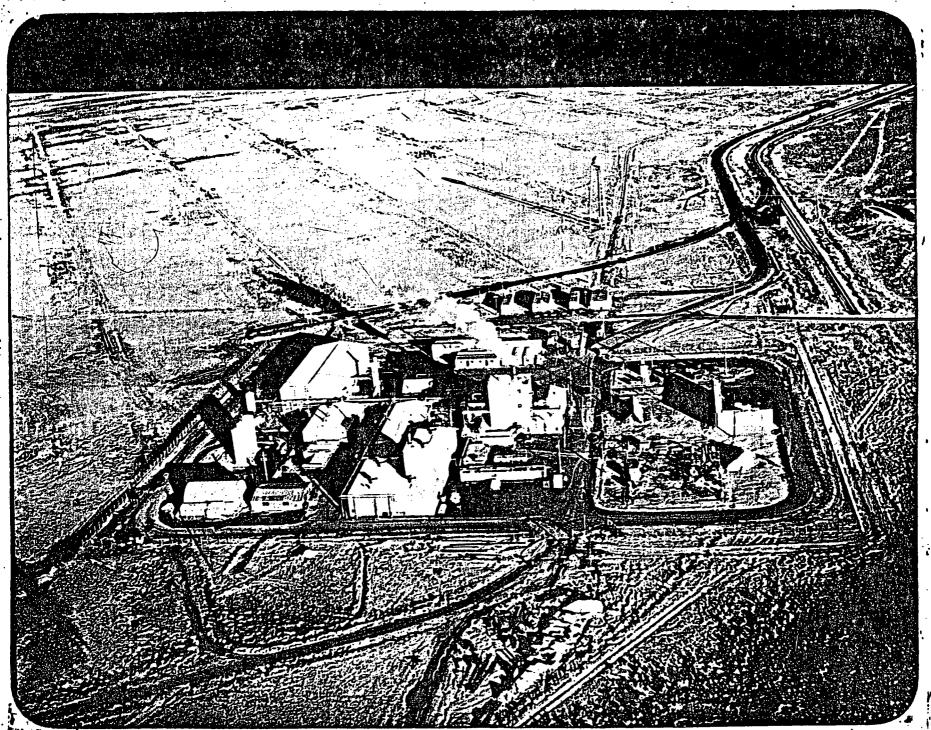
INCINERATION

MEHTOD:

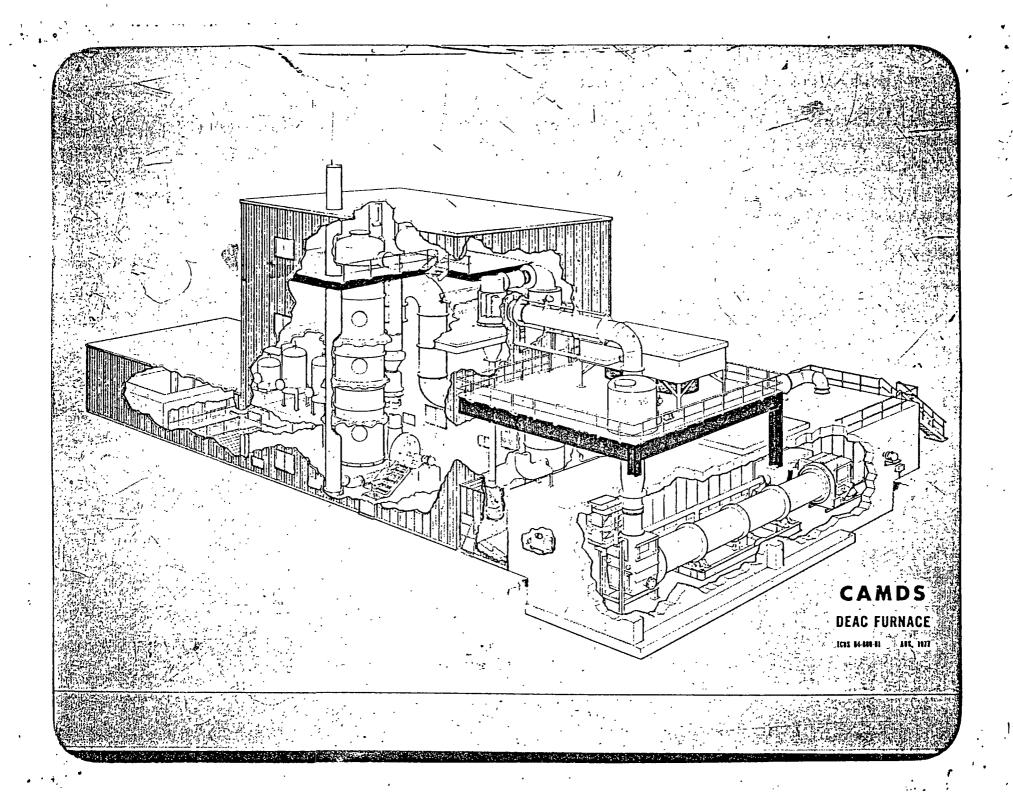
O CHEMICAL NEUTRALIZATION

PHILOSOPHY

- EXISTING PROVEN TECHNOLOGY (CAMDS)
- O NEW TECHNOLOGY



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POTENTIAL PLANT EFFLUENTS

- GASEOUS .
 - -VENTILATION AIR zero discharge thru redunaant felters
 - -FURNACE EXHAUSTS
- LIQUID
 - -WASH DOWN WASTES
 - -SCRUBBER BRINE (TENTATIVE)
- SOLIDS (HEAT TREATED)
 - -MUNITION BODIES (CHAR FILLED)
 - -SCRAP METAL
 - -ASH

VENTILATION AIR

AGENT CONTAINMENT AND MINIMIZATION OF AGENT CONCENTRATIONS WITHIN THE PLANT WILL BE ACHIEVED BY:

- NEGATIVE PRESSURE
- HIGH AIR FLOW RATES (UP TO 25 AIR CHANGES PER HOUR)
- LOCAL VENTILATION (AT SOURCES OF CONTAMINATION)
- DIRECTED VENTILATION (FROM LOW TO HIGH LEVELS OF CONTAMINATION)

FEATURES OF THE VENTILATION AIR SYSTEM

- AIR CONDITIONING IS PLANNED TO REDUCE HEAT LOAD ON SUITED PERSONNEL.
- AIR LEAVING TOXIC AREA WILL BE PASSED THROUGH REDUNDANT BANKS OF HEPA FILTERS.
- FILTERS WILL BE MONITORED FOR "BREAKTHROUGH".
- WHERE OTHER ORGANIC MATERIALS ARE PRESENT (I.E., THE LAB) CHARCOAL ELEMENTS WILL BE ADDED TO THE FILTERS.

BZ INTERIM DESIGN EXPOSURE ACCEPTABLE LIMITS (IDEALs)*

- WORK AREA 0.004 MG BZ/M3 FOR 8 HR/DAY (40 HR/WK).
- GENERAL POPULATION 0.0001 MG BZ/M³ FOR 24 HR/DAY AND TOLERANCE FOR DIFFERENCES IN SUSCEPTIBILITY.
- INPLANT ALARM 1.0 MG BZ/M³ IN 5 MINUTES.

* ESTABLISHED BY THE ARMY SURGEON GENERAL

TYPICAL TARGET DESTRUCTION CONSIDERATIONS

- US ARMY ENVIRONMENTAL HYGIENE AGENCY GUIDELINES
- 0.36 MG/M³ TARGET MAXIMUM ALLOWABLE BZ STACK EMISSION. CALCULATED BASED ON:
 - * GROUND-LEVEL BZ CONCENTRATION OF 0.1 µG/M³
 (GENERAL POPULATION CEILING LEVEL)
 - * TYPICAL FLOWRATES/STACK HEIGHTS
 - * WORST-CASE METEROLOGICAL CONDITIONS
- 99.994% MINIMUM REQUIRED DESTRUCTION EFFICIENCY

ANTICIPATED BZ DESTRUCTION LEVEL

- TARGET MINIMUM = 99.994%
- DESTRUCTION EFFICIENCY FOR BZ ACHIEVED IN TEST FACILITY (800° C, 3% 0_2 , 0.8 SEC RESIDENCE TIME) = 99.99975%
- AFTERBURNER FOR PLANT WILL OPERATE AT 825°C, 3% 0₂, AND 1.0 SEC RESIDENCE TIME
- ACHIEVED DESTRUCTION EFFICIENCY WILL BE WELL IN EXCESS OF THE REQUIRED 99.994%

AVERAGE SIMULANT MUNITION EMISSIONS

	MEASURED CONCENTRATION*	AMBIENT ** CONCENTRATION	ARKANSAS STANDARD
PARTICULATES (gr/dscf	,		•
corrected to 12% CO ₂)	0.024		0.2
NO _X (PPM)	40.6		-,-
SO ₂ (PPM)	411.45	0.025	0.2
SO ₃ /acid mist (ug/m ³)	160,000	10.4	30.0

^{*} AFTERBURNER EXHAUST

^{**} CALCULATED USING DISPERSION MODEL

^{***}STACK ENISSION STANDARD

PROCESS LIQUID EFFLUENTS

- SCRUBBER BRINE (TENTATIVE)
- DECONTAMINATION SOLUTIONS
- DECON SHOWER WATERS

LIQUID TREATMENT OPTION #1

INCINERATE AQUEOUS WASTES IN AN ONSITE LIQUID INCINERATOR.

LIQUID TREATMENT OPTION # 2

- REMOVE BZ BY ION EXCHANGE
- TREAT EFFLUENT UNTIL BZ IS BELOW DETECTABLE LIMITS (4 ppb)
- DISCHARGE TO EXISTING IMTP
- LIQUID WOULD HAVE TO BE COMPATIBLE WITH IWTP TREATMENT CAPABILITIES FOR INDUSTRIAL POLLUTANTS

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SOLID WASTE

- ALL SOLID MATERIALS TO BE PROCESSED WILL BE HEAT TREATED/INCINERATED TO DESTROY ANY BZ CONTAMINATION (IE, THERMALLY DECONTAMINATED).
- EXTRACTIVE PROCEDURE (EP) TOXICITY CHARACTERIZATION (40 CFR APPENDIX II) WILL BE MADE ON MUNITION RESIDUE (CHAR).
- THERMALLY DECONTAMINATED MATERIALS WILL BE SOLD AS SCRAP OR SENT TO AN APPROPRIATE LANDFILL
- IF THE BAGHOUSE IS UTILIZED, COLLECTED DUST WILL BE SUBJECTED TO EP TOXICITY TEST.

THE COMPLEX IS NOT CONSIDERED TO BE A HAZARDOUS

WASTE INCINERATOR COMPLEX BECAUSE:

- BZ (3-QUINUCLIDINYL BENZILATE) IS NOT A LISTED HAZARDOUS WASTE (40 CFR 261.33) OR A LISTED HAZARDOUS CONSTITUENT (40 CFR 261 APPENDIX VIII)
- MUNITION IS NOT CONSIDERED A REACTIVE HAZARDOUS WASTE
- ONLY REACTIVE HAZARDOUS WASTE (40 CFR 261.231 (8))
 COMPONENT IS THE WASTE EXPLOSIVES IN DET CORD (AN INCIDENTAL ITEM)
- INCINERATION OF IGNITABLE (ONLY) HAZARDOUS WASTES MAY BE EXEMPTED FROM INCINERATION PERFORMANCE STANDARDS (40 CFR 264.340(B) (1))

CHAR COMPOSITION OF INCINERATED M18'S

	% BY WEIGHT
TOTAL CARBON	17.4
CARBONATE	3.9
TOTAL SULFUR	11.9
SULFIDE	1.6
NITROGEN	1.1
POTASSIUM	17.8
SODIUM	12.5
CHLORIDE	6.9

NATIONAL ENVIRONMENTAL POLICY ACT (NEPA)*

- 1. FEDERAL AGENCIES ARE REQUIRED TO GIVE APPROPRIATE PRE-DECISIONAL CONSIDERATIONS TO THE ENVIRONMENTAL EFFECTS ASSOCIATED WITH THEIR PROPOSED ACTION.
- 2. PREPARE ENVIRONMENTAL DOCUMENTATION REGARDING
 - POTENTIAL IMPACTS OF THE PRIMARY AND ALTERNATIVE DECISIONS \
 - MITIGATIVE MEASURE THAT CAN BE TAKEN TO AVOID IMPACTS, AND
 - LISTING OF UNAVOIDABLE IMPACTS ASSOCIATED WITH THE DECISIONS.
- 3. GUIDELINES FOR THE DOCUMENTS (EA or EIS) ARE PROVIDED BY COUNCIL ON ENVIRONMENTAL QUALITY (CEQ) (40 CFR 1500-1508).
- 4. DEPARTMENT OF DEFENSE (DOD) FILED GUIDELINES DOD DIR-ECTIVE 6005.1 (32 CFR 214) FOR COMPLIANCE WITH NEPA AS DIRECTED BY CEQ.
- 5. DEPARTMENT OF THE ARMY (DA) FILED GUIDELINES ARE 200-2 (32 CFR 650,651) FOR COMPLIANCE WITH NEPA AS DIRECTED BY CEQ.

*NOTICE OF INTENT (NOI) TO PREPARE ENVIRONMENTAL DOCUMENTATION AND INITIATE SCOPING PUBLISHED IN FEDERAL REGISTER (47 FR 14937, 7 APRIL 1982).

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ENVIRONMENTAL SUBJECT AREAS

- AIR QUALITY
- WATER QUALITY
- SOLID AND HAZARDOUS WASTES
- OCCUPATIONAL HEALTH SAFETY
- TRANSPORTATION
- SOCIOECONOMIC
- LAND USE
- HISTORIC PRESERVATION
- ENDANGERED OR THREATENED SPECIES
- NOISE

TODAY'S SCOPING TOPICS

TOPIC CONSIDERATION

AIR QUALITY "POINT MAX" IS BEING USED FOR ATMOSPHERIC

DISPERSION MODELING

WATER QUALITY LIQUID DISCHARGE CRITERIA OF NO DETECTABLE

(IF LIQUID IS BZ (AT PLANT) IS RECOMMENDED

DISCHARGED) IS MODIFICATION OF THE EXISTING IWTP PERMIT

REQUIRED FOR BZ?

SOLID/HAZARDOUS WASTE FACILITY IS NOT CONSIDERED A HAZARDOUS

WASTE INCINERATOR